Live Demonstration: an IoT SmartWatch-based System for Intensive Care Monitoring

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***Abstract*—Nowadays, wearable devices are largely spread in many fields and in wellness monitoring too. In this paper we propose a smartwatch-based IoT system to improve the monitoring efficacy of critical hospitalized patients. The medical doctor assigned to the unit can access patients' information at any time and from any place by wearing a smartwatch. The bio-sensing platforms, which measure metabolites' concentration in the patients, are wirelessly connected with a dedicated application running on the smartwatch. In case of anomalous measured values, incoming alert notifications are received to ask urgent medical intervention. In this way, the doctor, or in general the caregiver, can freely move in the hospital areas and perform several tasks in parallel without losing the monitoring of the patients under their responsibility.**

I. Demonstration Setup

The aim of the demo is to reproduce the monitoring system architecture and the protocol communication we have realized. Three are three main building blocks for the architecture (Fig. 1): (a) a Client Android™ interface, running on a bedside tablet, directly paired with the bio-sensing platform on the patient, (b) an Android intermediary Server-side, running on a tablet/smartphone in a central workstation, that collects data from different clients and enables the bidirectional communication with them, and (c) a SmartWatch application on the doctor watch device. Since we adopted Android Wear 1.0, the intermediary Server-side acts as a bridge to enable and handle the multi-patients monitoring from the smartwatch. To recreate and validate the architecture we will carry these devices: a Galaxy Note pro 12.2 in and a Galaxy Tab 2 simultaneously connected as clients, a Nexus 7 as intermediary server and a Sony Smartwatch 3.

Two main processes of the bi-directional communication protocol will be simulated: (i) requesting data from smartwatch (the blue process on the top of Fig. 2) and (ii) alerting user in case of anomalies in recorded values (the purple process on the bottom of Fig. 2).

We will need: (i) a table for the set-up, (ii) charger plugs, (iii) Internet connection and (iv) stand for a poster where technical details of the IoT architecture will be summarized.

II. Visitor Experience

Visitors will be attracted by videos continuously projected on the pc monitor. Those videos where recorded while validating the system: (i) connection of the patient-client to the monitoring system, (ii) doctor requests for parameters from the smartwatch and (iii) alert notification in case of out-of-safe-range parameter. In addition we will be able to let them try these main features of the system with the available devices. Further, thank to the poster, we will be able to explain in detail the background architecture if interested.

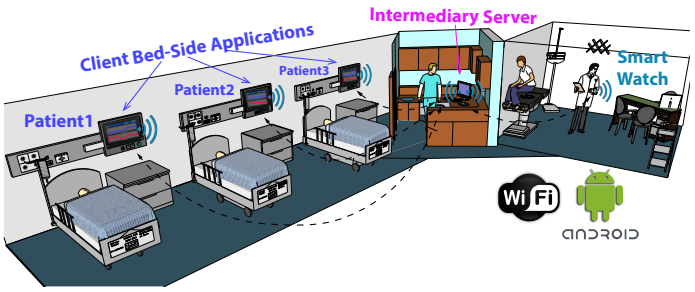

Figura 1. Monitoring scenario: a.) Client-Android app directly connected with each patients bio-sensor, b.) Server app redirects data to a c.) SMartWatch app to keep the medical doctor continuously connected.

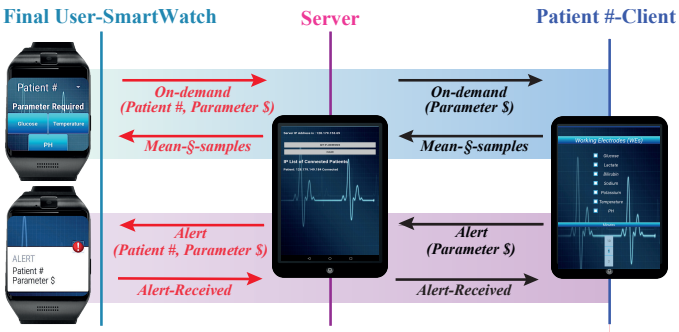

Figura 2. Communication protocol: a.) Client Patient #, b.) Server and c.) SmartWatch Final User.

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Earlier Publication

[1] F. Stradolini, E. Lavalle, G. De Micheli, P. Motto Ros, D. Demarchi, and S. Carrara, "Paradigm-shifting players for iot: Smart-watches for intensive care monitoring," in *MobiHealth*. Springer, 2016, pp. 71–78.

[2] F. Stradolini, "Smart-watches as paradigm-shifting players in iot: A system for connecting intensive care doctors and their patients," 6,7 April 2017, droidcon ITA.